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Provisional Statistics

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Focus. . . Cause-of-Death Reporting Changes from ICD-9 to ICD-10

Effective with 1999 deaths, the causes of death in the United States have been coded, selected, and classified using a new system.

Anyone who uses mortality data needs to be aware of the effects of these changes. If we do not take them into account, our attempts to track trends over time could be distorted and misleading.

This article is intended to give a basic understanding of the nature of the changes, and tools for making comparisons despite discontinuities in data.

International Classification of Diseases

Beginning with deaths occurring January 1, 1999, Missouri and nearly all other states are using the Tenth Revision of the International Classification of Diseases (ICD-10) instead of the Ninth Revision (ICD-9) for coding underlying cause of death.

The ICD is a classification system developed collaboratively by the World Health Organization (WHO) and ten international centers so that the medical terms reported by physicians, medical examiners and coroners on death certificates can be grouped for statistical purposes. The United States is required to use the ICD under an agreement with WHO which has the authority of a treaty.

Periodic revisions are made to reflect advances in medical science and changes in diagnostic terminology. Since 1900 a new revision of the ICD has been implemented about every ten years—until the ICD-9, which was used for 20 years of data (1979-1998).

Coding

The most visible changes are the characters used in the codes. ICD-10 codes have an alphabetic character in the first position, while ICD-9 codes were numeric. For example, Alzheimer's disease was 331.0 under ICD-9 and is G30 under ICD-10.

The number of categories has increased from approximately 4,000 to approximately 8,000, allowing for more detail in statistical analysis. The additional detail will be particularly useful in morbidity applications (hospitals, physicians' offices, etc.). The date for that transition has not yet been set.

Despite the large number of additional codes, there are some categories for which there are fewer codes under the new system. For example, we will no longer be able to separate accidental poisonings due to barbiturates from those due to psychostimulants.

Selecting

The most significant changes, however, are not as readily apparent from looking at a list of codes. These are the changes in the rules used to choose the single underlying cause for those deaths to which more than one cause contributed.

Many deaths involve more than one disease or injury. The death certificate has four lines on which to record these contributing factors, and doctors are called upon to choose from among them "the disease or injury that initiated events resulting in death." If the doctor's choice cannot be determined or seems illogical, the ICD provides a set of rules for choosing from among the conditions mentioned which one is to be used for statistical tabulation.

The new rules under ICD-10 mean that a death that would have been attributed to a certain cause under ICD-9 could be attributed to a different cause under ICD-10.

Therefore, a rise or fall in the number of deaths attributed to a certain cause might be due to changes in selection rules rather than to a change in the actual pattern of causes of death. It is also possible that an actual increase or decrease in deaths due to a certain cause could be hidden by a compensating change due to ICD-10.

One of the most striking such changes is for pneumonia. The number of deaths attributed to pneumonia for 1999 is about 70 percent of what it would have been under ICD-9. This is primarily due to application of a rule that if the condition which otherwise would have been selected "is obviously a direct consequence of another reported condition," regardless of where on the certificate it was reported, the primary condition should be chosen. Pneumonia can result from a large number of other diseases and traumas, so the deaths attributable to pneumonia under ICD-9 but not ICD-10 are scattered among a large number of other causes.

The rule changes are the main way in which the transition from ICD-9 to ICD-10 causes a discontinuity in mortality data.

Classifying

There are also changes in the way causes of death are classified into groups for ranking and for comparing data among countries. Those groupings are arranged in "tabulation lists."

The list that will be most widely used by the National Center for Health Statistics and other federal agencies is the ICD-10 List of 113 Selected Causes of Death, which replaces the ICD-9 List of 72 Selected Causes of Death. This list is used to identify and rank the leading causes of death in the U.S. A separate list for analyzing causes of infant deaths is being expanded from 61 to 130 causes.

Changes in the tabulation lists can interfere with attempts to track trends across revisions. For example, ICD-9's tabulation tables included medical misadventures among the unintentional injuries, but ICD-10 excludes them. In Table 1, we see "N/A" by "Other unintentional injuries." This is because ICD-9's tabulation list had just the two unintentional injury categories shown—motor vehicle (MVA), and all other—while ICD-10's tabulation list of 113 causes includes "Other land transport," "Falls," and several others in addition to MVAs.

Comparing

Numbers of deaths for 1999 may differ from what they would have been under ICD-9 because of changes in either the way underlying causes are assigned or the way they are grouped. How can a data user compare mortality data for 1999 and after with prior data? The short answer is, "very cautiously."

A somewhat more helpful answer is, "by very cautiously applying comparability ratios."

Comparability ratios are calculated from the results of "double coding" or "bridge-coding" studies, in which a large number of records from a recent year are coded using both the previous system and the new system. Such a study has been done by NCHS for each ICD revision since the transition from the Fifth to the Sixth. For the current revision, NCHS has done a preliminary study by coding 1.85 million (80 percent) of US deaths for 1996 under ICD-9 and again under ICD-10.

Comparability ratios for causes are then calculated by dividing the number of deaths attributed to that cause according to the new version by the number of deaths classified to the most nearly comparable cause of death using the previous revision. The result is the proportion the new number of deaths is of the old number of deaths.

Comparability ratios for this transition for selected causes are shown in Table 1. For example, the seventy percent mentioned earlier for pneumonia is shown as 0.70 in the table for "Influenza and pneumonia."

Each ratio represents the net effect of the new revision on statistics for its cause and can be used as a factor to adjust statistics for that cause as classified by a previous revision to be comparable to the statistics for the same cause as classified by the new revision.

For example, the number of 1999 Alzheimer's disease deaths divided by the comparability ratio is 920/1.55=594, which is more comparable to the number in earlier years.

Many causes have comparability ratios close to one. Suicide and homicide have ratios of 1.00, and cancers have ratios close to one. The ratios for cancers of the prostate, pancreas, kidney, bladder, colon/rectum, and ovary are all 1.00. But even a ratio showing perfect correspondence (1.00) between the two revisions does not necessarily indicate that the cause is unaffected by changes in classification and coding, because changes may compensate for each other.

Another precaution is that these ratios are preliminary. Final ratios based on all 1996 deaths are expected in 2002. They will include state-specific ratios and ratios for more detailed causes.

We do not know how different the comparability ratios for Missouri might be from the national ones. Particularly in the case of motor vehicle crash injury deaths, Missouri's experience so far is not demonstrating the fifteen percent decrease predicted by the national ratio. These ratios might also vary by region or year depending on the way doctors in that region or time period fill out death certificates.

Care must also be taken to apply comparability ratios only to the causes for which they were calculated. As Table 1 illustrates, the ratios for subheadings are not the same as those of the larger categories to which they belong.

We also need to be especially cautious concerning causes with fewer than 100 deaths, due to the variability inherent in small numbers.

Despite all the cautions necessary, these ratios provide us the best estimates presently available for making comparisons across ICD revisions.

Note: Even if the transition to ICD-10 had not made a discontinuity in the meaning of *numbers* of deaths, the age-adjusted *rates* published for 1999 would not be comparable to those for previous years because a new standard population is used. For more on that change, see *Missouri Monthly Vital Statistics*. "Effects of Changing from the 1940 to the Year 2000 Standard Population for Age-Adjusted Death Rates in Missouri." February 2000; 33 (12).

Sources:

International Statistical Classification of Diseases and Related Health Problems, Tenth Revision. Geneva: World Health Organization, 1992.

Anderson, Robert N, Ph.D. and Kenneth D Kochanek, MA, "ICD-10 Implementation: The National Perspective and Impact," paper prepared for NCHS Data Users' Conference, July 2000.

Kochanek, Kenneth D, MA, Betty L Smith, and Robert N. Anderson, Ph.D., draft excerpt from technical notes to "Deaths, Preliminary Data for 1999," *National Vital Statistics Reports*, as yet unpublished.

A Guide to State Implementation of ICD-10 for Mortality, Part II: Applying Comparability Ratios, National Center for Health Statistics, December 4, 2000.

Table 1
Effects of ICD Tenth Revision on Selected Causes of Death:
Missouri Residents, 1998 and 1999

Cause of Death	Missouri Resident Deaths		Preliminary Comparability Ratio	Estimate of 1999 Deaths under ICD-9
	1998 (ICD-9)	1999 (ICD-10)		
Tuberculosis	18	18	0.85	21
Septicemia	511	623	1.19	524
Syphilis	15	7	0.64	11
AIDS	145	148	1.06	140
Malignant neoplasms (cancers)	12,377	12,177	1.01	12,056
Malignant neoplasm of trachea, bronchus & lung	3,876	3,632	0.98	3,706
Malignant neoplasm of breast	908	867	1.01	858
Malignant neoplasm of prostate	685	657	1.01	650
Benign/in situ neoplasms, neoplasms of uncertain or unknown behavior	156	302	1.67	181
Anemia	112	113	0.96	118
Diabetes mellitus	1,390	1,553	1.01	1,538
Parkinson's disease	328	325	1.00	325
Alzheimer's disease	529	920	1.55	594
Major cardiovascular diseases	22,958	23,307	1.00	23,307
Diseases of heart	17,841	17,954	0.99	18,135
Hypertensive heart disease*	522	523	0.80	654
Ischemic heart diseases*	12,969	13,076	1.00	13,076
Other heart disease*	4,223	4,206	0.97	4,337
Essential hypertension	248	327	1.12	292
Cerebrovascular diseases	3,962	4,018	1.06	3,791
Atherosclerosis	274	328	0.96	342
Other circulatory diseases	633	680	0.95	716
Aortic aneurysm and dissection	377	429	1.00	429
Influenza and pneumonia	2,438	1,678	0.70	2,397
Chronic lower respiratory diseases	2,735	3,063	1.05	2,917
Pneumonitis due to solids and liquids	239	351	1.12	313
Peptic ulcer	125	91	0.97	94
Chronic liver disease and cirrhosis	377	421	1.04	405
Nephritis and nephrosis	706	915	1.23	744
Conditions originating in perinatal period	255	278	1.07	260
Congenital anomalies	237	231	0.85	272
Sudden infant death syndrome	77	56	1.04	54
Symptoms and ill-defined conditions	280	260	0.96	271
Unintentional injuries	2,381	2,303	1.03	2,236
Motor vehicle crashes	1,159	1,074	0.85	1,264
Other unintentional injuries	1,222	1,229	N/A	N/A
Suicide	691	698	1.00	698
Homicide	441	382	1.00	382
Drug-induced deaths	249	285	1.20	238
Alcohol-induced deaths	360	394	0.97	406

*Counts for some causes differ from those in *Missouri Vital Statistics* because its definitions differ from NCHS's.

Provisional Vital Statistics for October 2000

Live births decreased in October as 5,638 babies were born compared with 6,372 one year earlier. Cumulative births for the 10- and 12-month periods ending with October both show increases. For the 10 months ending with October, births increased by 0.7 percent from 63,144 to 63,612.

Deaths increased for all three time periods shown below as 5,027 Missourians died in October compared with 4,533 in October 1999.

The Natural increase in October was 611 (5,638 births minus 5,027 deaths) compared with 1,839 in October 1999. The natural increase for January-October was virtually the same as the previous comparable period.

Marriages decreased in October as 4,575 Missouri couples married compared with 4,699 one year earlier.

Dissolutions of marriage increased for all three time periods shown below. For the 12 months ending with October, the marriage to divorce ratio decreased from 1.81 to 1.67.

Infant deaths decreased slightly for all three time periods shown below. For January-October the infant death rate decreased from 7.6 to 7.5 per 1,000 live births.

PROVISIONAL VITAL STATISTICS FOR OCTOBER 2000

Item	October Number 1999	October Number 2000	October Rate* 1999	October Rate* 2000	Jan.-Oct. cumulative Number 1999	Jan.-Oct. cumulative Number 2000	Jan.-Oct. cumulative Rate* 1999	Jan.-Oct. cumulative Rate* 2000	12 months ending with October Number 1999	12 months ending with October Number 2000	12 months ending with October Rate* 1998	12 months ending with October Rate* 1999	12 months ending with October Rate* 2000
Live Births	6,372	5,638	13.7	11.4	63,144	63,612	13.8	13.9	76,080	76,226	13.8	13.9	14.0
Deaths	4,533	5,027	9.7	10.2	45,733	46,121	10.0	10.1	54,567	55,343	9.9	10.0	10.1
Natural increase ...	1,839	611	3.9	1.2	17,411	17,491	3.8	3.8	21,513	20,883	3.9	3.9	3.8
Marriages	4,699	4,575	10.1	9.3	38,615	38,955	8.5	8.5	44,152	44,709	8.1	8.1	8.1
Dissolutions	1,746	2,369	3.7	4.8	20,090	22,339	4.4	4.9	24,385	26,832	4.7	4.5	4.9
Infant deaths	55	49	8.6	8.7	483	476	7.6	7.5	572	581	7.9	7.5	7.6
Population base .... (in thousands)	...	...	5,468	5,500	...	...	5,468	5,500	...	...	5,433	5,464	5,495

* Rates for live births, deaths, natural increase, marriages and dissolutions are computed on the number per 1000 estimated population. The infant death rate is based on the number of infant deaths per 1000 live births. Rates are adjusted to account for varying lengths of monthly reporting periods.

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